2 BROADBAND DESCRAMBLING TECHNOLOGY

MCSI has developed and demonstrated a proprietary technology for controlling the simultaneous access and descrambling of many scrambled TV channels on a CATV system. This technology enables a CATV system operator to eliminate the need for any set-top descramblers in subscribers homes and thus facilitates the subscriber's use of all cable ready features purchased with today's television receivers and VCR's, including additional TV outlet service for all authorized channels. All this is done while preserving a scrambled signal distribution on the cable plant on the one hand, and by supplying a broadband signal to the home in which all authorized channels are simultaneously descrambled and provided in the clear at every TV outlet in the home.

Because the MCSI technology is based on digital broadband RF signal processing techniques, it can simultaneously descramble a number of channels, while at the same time process other selected channels to further deny clear access. While this processing is being done, all other unprocessed channels carried on the cable system are passed through to the subscriber unaltered by the DBD hardware. The final result is that the entire spectrum of channels is made available to the subscriber, with authorized channels descrambled, and the unauthorized channels passed through in their original scrambled form, or even further processed in the MCSI subscriber unit to affect further denial beyond normal scrambling, i.e., provide additional security. This additional denial feature also provides the operator the ability to deny otherwise clear signals in an expanded basic tier without the need to scramble those signals at the headend, and without the need to provide the majority of subscribers with a descrambler.

Recently, the Company began to demonstrate in its San Diego facility an engineering feasibility prototype system to cable system operators. This limited implementation of MCSI's technology demonstrates simultaneous descrambling of any subset of a large group of channels, while passing all other channels unaltered. In addition, the prototypes demonstrates the effectiveness of various alternative modes of enhanced security, and an addressable on-screen textual display.

2.1 Compatibility with Existing Scrambling Systems

The MCSI descrambling technology can be implemented to descramble either the baseband sync suppressed scrambled signals such as those used in Zenith's Z-TAC systems, or the RF sync suppression scrambling method used by Jerrold, Scientific Atlanta, Pioneer and others. This allows for a cost effective backward compatible phased migration, perhaps over a number of years, from today's single channel set-top descramblers to multichannel broadband descramblers that may be installed on the pole, pedestal or the side of the subscriber's home or any other internal point of entry. Thus, an economically graceful migration from today's subscriber configurations as shown in Figure 1(a) to configurations shown in Figur 1(b) can be

accomplished with all the resultant benefits discussed below.

Because of its compatibility and ability to coexist with today's set-top converter/descramblers, MCSI technology can be implemented initially without changes to the existing headend addressable scramblers, controllers or their software. Thus, without the need of cable system upgrades, the MCSI approach will offer operators a much more attractive alternative for subscriber friendly access control systems than such cost intensive systems as Interdiction, or inflexible approaches as addressable traps being offered by some vendors.

Unlike set-top descramblers used today, the MCSI broadband descramblers introduce virtually no artifacts or distortion in either the audio or video signals on descrambled and non-blocked channels. Therefore, video and audio quality is significantly improved with respect to current set-top devices, and functions such as MTS stereo are fully retained without loss of performance associated with today's set-top descrambler degradations.

2.2 Transition to Proprietary Enhanced Scrambling

The MCSI system will offer cable system operators the ability to migrate to a new enhanced security multichannel video scrambling method developed by MCSI. This proprietary headend-originated security scheme will provide the enhanced security needed for pay-per-view and pay services for which current scrambling methods have been compromised by pirate decoders. Migration to MCSI's new enhanced security system may be accomplished on a channel by channel basis beginning with any channel for which all authorized subscribers are served by an installed MCSI access control device. This headend originated scrambling method will allow early and economic migration to the enhanced security mode in lower penetration, but high revenue producing, pay services.

2.3 Number of Processed Channels

MCSI employs a proprietary wide band digital spectral processing system which provides for separate and independent signal processing functions in each 6 MHz CATV channel within preselected channel groups. Because the Company's signal processing functions can be implemented over the entire CATV channel range, the incremental cost of increasing the number of controlled channels is quite low. When the MCSI technology is implemented in a limited number of custom VLSI chips the number of individually controlled channels can economically reach 72 or more.

MCSI's first product will provide for 36 channel processing capability, with pass-through transparency for all other non-processed channels up to 550 MHz or 750 MHz. Through the use of a plug-in expansion module, an additional 36 channels can be processed, providing a total of 72 individually and simultaneously controlled channels. The MCSI subscriber device operates on remotely configureable groups of individually controlled contiguous channels, and does not

2.4 Additional Tiering Security by Signal Denial Processing

The MCSI subscriber devices can accomplish further video and/or audio denial of unauthorized channels, thereby providing additional security in subscriber locations in which they are installed. This approach instantly renders obsolete existing "pirate boxes" operating on scrambled channels. This feature may be used to deny access not only to head-end originated scrambled channels, but also to clear channels that may be a part of an expanded basic tier that has high penetration. In this way, DBD devices can be installed initially only in subscriber locations which require the pay scrambled tiers or only the bare basic tier, thereby providing denial of the expanded basic clear channels and providing access control to higher pay tiers without buy-through constraints. An example of such arrangement is shown in Figure 3. Thus, cost effective tiering can be accomplished without scrambling any of the basic channels. It becomes clear that DBD devices simultaneously provide positive security on some channels and negative security on other channels, as configured by addressable control from the headend.

In addition to addressable channel tiering capability, each subscriber module is equipped with an addressable control enabling connect/disconnect capability. This feature allows for the elimination of truck rolls for service disconnects and reconnects.

2.5 On Screen Display Capability

Another feature of the MCSI system is an optional provision for On-Screen Display (OSD) text insertion capability within the subscriber module that can be individually controlled on an addressable basis from the headend. This addressable OSD option can be used for downloadable addressable textual messages inserted on selected channels for billing or disconnect messages, or diagnostic applications.

2.6 Projected Cost

The MCSI system makes use of certain digital signal processing chips that have recently been developed for personal computers and digital cellular telephony. Thus, tremendous cost and time advantages can be gained, since these complex chips are already developed and are in high volume production and readily available at low cost.

MCSI's products are projected to be priced at an average of $140 per addressable subscriber - roughly the ammount a cable operator now invests on an addressable subscriber (1.3 sets/sub). Cost reductions achieved through economies of scale inherent in larger volume production, and learning curve experience, will enable the costs of DBD devices per addressable subscriber to be even less than today's single channel descrambling technology.

2.7 Product Configurations

Two product configurations have been considered. The first device is a Single Family dwelling Unit (SFU) that is mounted on the side of the home and powered from the subscriber

premises. The second configuration is designed to serve subscribers in Multiple Dwelling Unit (MDU) housing including apartments, condominiums, and mobile home parks, as well as pole and pedestal mounts for which multiple DBD subscriber devices can share a common enclosure. The advantages of providing an MDU product configuration are derived from the lower electronics and installation costs per subscriber due to the sharing of electronics and the secure enclosure.

The systems designed for Baseband Sync suppression compatibility and those designed for RF Sync suppression compatibility are designed such that when configured for MCSI's enhanced scrambling, their operation is identical and they may coexist on one cable system utilizing the MCSI enhanced scrambling mode.

2.8 Pay-per-view (PPV) and IPPV

Because the first version of MCSI's subscriber units would be compatible with existing scrambling systems, they can be addressed through the exiting ANI an ARU IPPV system, thereby offering these capabilities to subscribers equipped with DBD devices. Similarly, cable system employing CSR's for reservation PPV will be able to address the DBD units as usual.

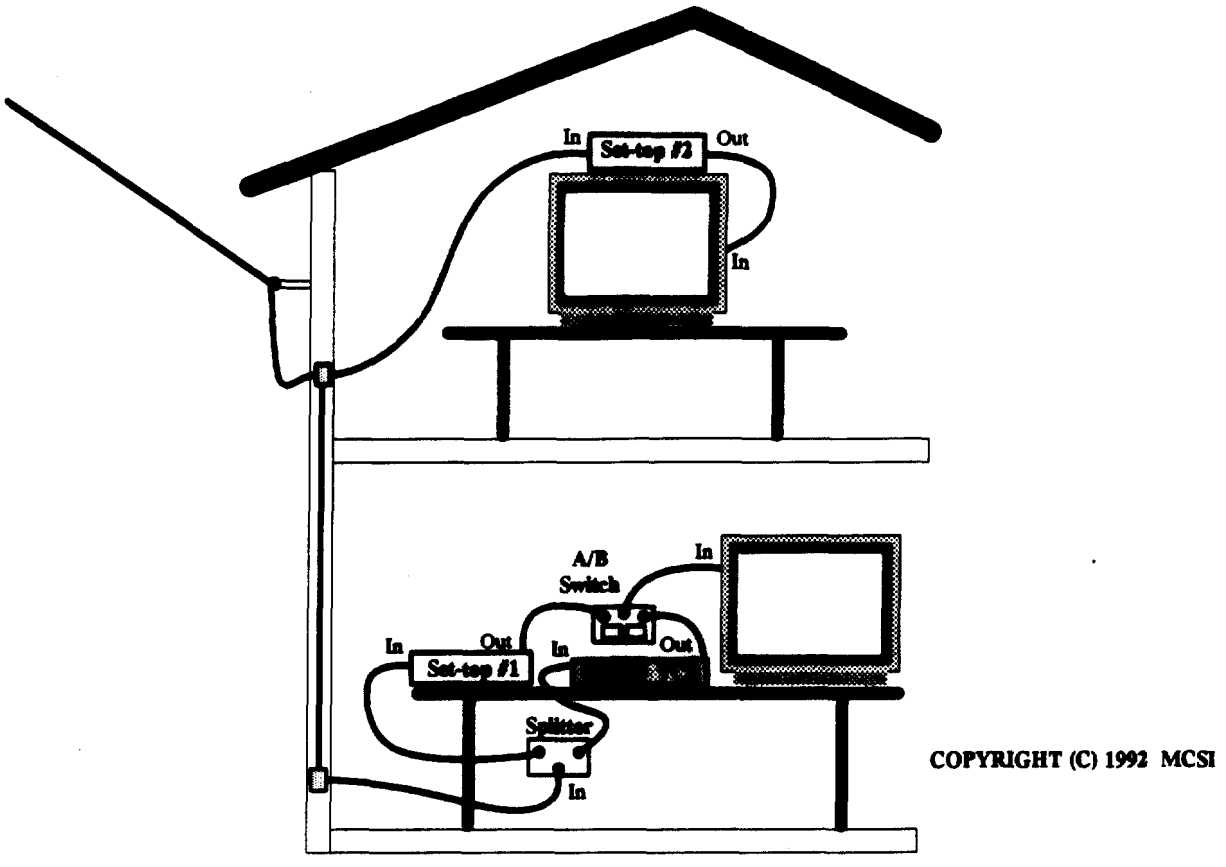

Figure 1 (a). Typical cable hook-up with conventional set-top descramblers

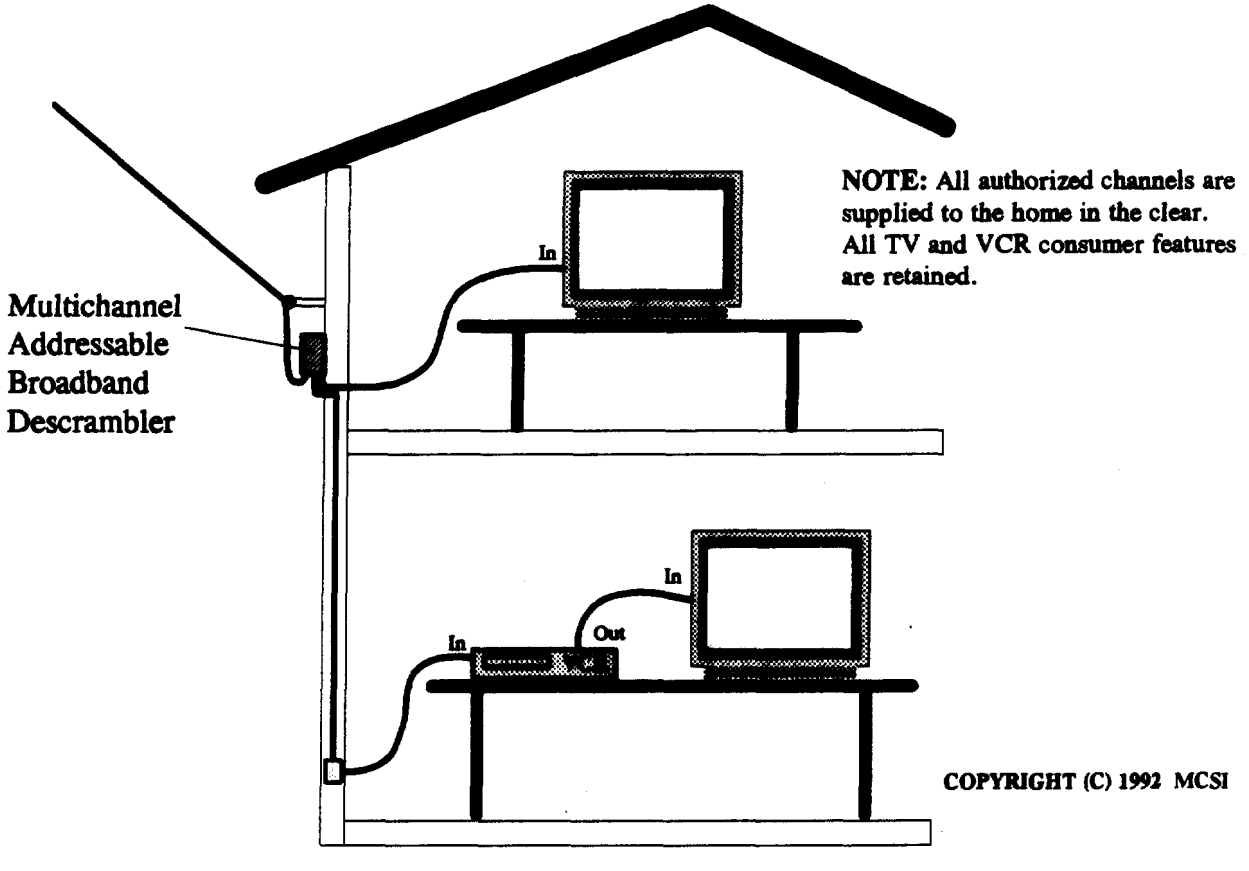

Figure 1 (b). Cable hook-up with Point of Entry multichannel Broadband Descrambler

Figure 2(a) **CONVENTIONAL SET-TOP DESCRAMBLER OPERATION**

Cable Channel: 2 3 18 19 20 21 22 23 24 25 26 27 · · · · 59 60 61 62 63 64 . . . . . .

BROADBAND DESCRAMBLER OPERATION
- EXAMPLE -

Service Tiers Offered by a Cable System:

Basic Service: Chs. 2 - 18
Pay Services: Chs. 23, 26, 29, 30, 60, 61, 63, 64
Cable Programming Services:
Tier 1: Chs. 21, 22, 24, 25, 31 - 59
Tier 2: Chs. 19, 20, 27, 28, 62

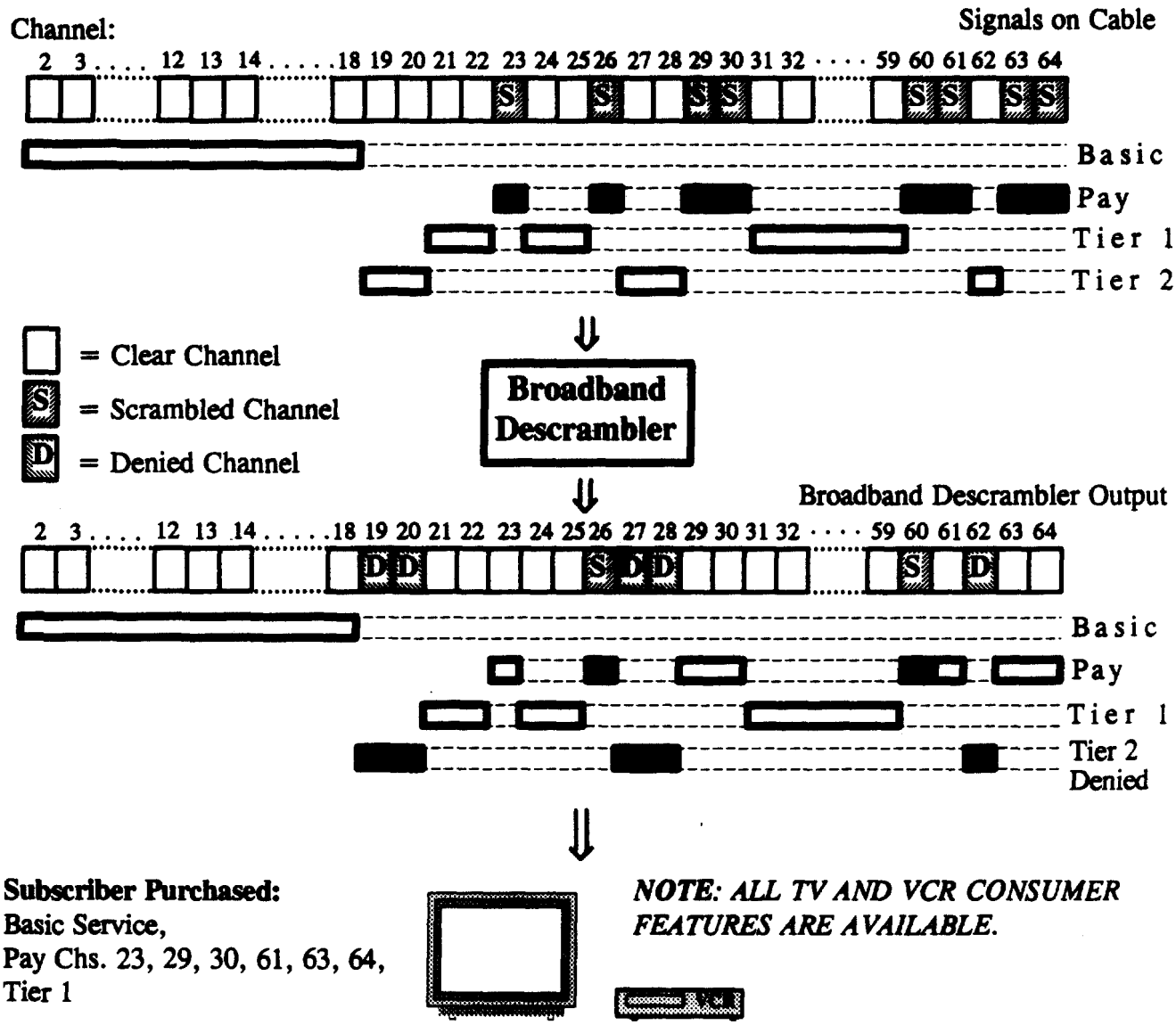

FIGURE 3